

COURTSHIP BEHAVIOR IN *BATHYPLECTES ANURUS* (THOMSON) (HYMENOPTERA: ICHNEUMONIDAE)¹

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ABSTRACT: We report information on *Bathyplectes anurus* (Thomson) courtship behavior.

DESCRIPTORS: Sexual behavior, courtship, biological control, Ichneumonidae, *Bathyplectes anurus* (Thomson).

Bathyplectes anurus (Thomson), a European species of ichneumonid, was imported as a biological control agent for the alfalfa weevil *Hypera postica* (Gyllenhal) and has become established. Although this report is incomplete, the difficulty of collecting material, the complicated diapause of *B. anurus*, the unavailability of additional material, and the usefulness of courtship display as a species-recognition character prompts publication of this paper so that field workers can use this information. We gratefully acknowledge the generous donation of material for these studies by W.H. Day, Beneficial Insect Research Laboratory, ARS, Newark, Delaware, who is coordinating the USDA biological control program against the alfalfa weevil.

Cocoons of *B. anurus* reared in the laboratory from parasitized hosts collected during 1974 in Pennsylvania were individually placed in gelatin capsules. After emergence, in the spring of 1975, virgin males and females were placed together in pairs in petri dishes and observed under a dissecting microscope. Some pairs that copulated were immediately fixed in alcoholic Bouin's, later stained in acid fuchsin, and slide mounted in Canada balsam. The following account is based on observations of 18 successful copulations.

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We never observed copulation or male excitation later than 11 A.M. although virgin pairs were placed together and observed during all daylight hours. The earliest observed copulation took place at 7:45 A.M. The male first walked around the container, vibrated his antennae in the air and on the substrate, and held the wings in repose over the abdomen. A change in this behavior occurred when a female was within 2 - 5 cm. at which time the male raised his antennae, vibrated them in the air at an angle of 50 - 80° with the substrate and spread 50 - 100°, fluttered his wings, and usually turned in 1 - 4 small circles. Turning was often pivotal and was not always noted, but the antennal vibrations and wing fluttering was always observed. Next the male would chase the female, who, if receptive, would stop.

After the female stopped, the male assumed a copulatory stance without additional observable courtship. During insertion of the aedeagus into the bursa copulatrix, the fore and middle tarsi of the male briefly touched the outer margins of the folded wings of the female.

The coital stance of the male (Fig. 1) was such that the tips of his wings touched the substrate, the hind legs were spread, and the tarsi also touched the substrate, which formed a tripod for support. The fore and middle legs were extended but did not touch the body of the female or the substrate. The antennae of the male were spread, subtending an angle of 20 - 70°, and slowly waved asynchronously. During coitus the female remained quiescent with antennae porrect and spread 40°.

Pairs remained *in copulo* $4:31 \pm 0.57$ min. (range 3:25 - 6:43). The union was terminated by either sex, but most often by the male. One female used her hind tibial spur to disengage the male genitalia, but she had considerable difficulty, and we are not sure that it was not the male releasing his genitalic grasp that caused the disengagement. One male that had been *in copulo* with a female for a minute was observed being dragged around the container by the female. Thus it would seem that the male does have considerable control over copulation once he has been received by the female. Postcoital courtship activity was not observed.

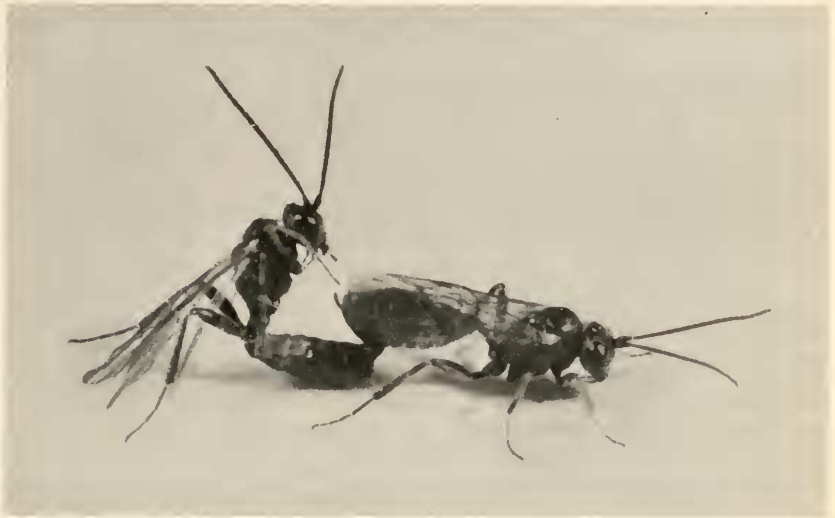


Figure 1. The coital stance of *Bathyplectes anurus* (Thomson).

Males that had copulated were not observed to show any subsequent interest in virgin females when they were provided with one during the first hour after coitus. However, one showed incipient interest after coitus by such activity as weak antennal fanning and wing flutters. Mated females always responded negatively to the attempt of a virgin male to copulate, that is, they flew or ran away when they came in contact with the male.

To determine the possible nature of the female attraction, we prepared homogenates of the female head, thorax and abdomen and offered each to virgin males. Homogenates of abdomens elicited male wing fluttering and turning.

Dissection of females that had been fixed immediately after copulation revealed a capsule in the genital tract which we believe to be a spermatophore.

Discussion

There have been no serious studies of sexual behavior in the Ichneumonidae and thus it is not possible to make comparative comments. From this preliminary study we suggest the following about sexual behavior in *B. anurus*:

1. An endogenous component may mediate sexual arousal in *B. anurus* males because virgin males demonstrated sexual excitement only during the morning.

2. The precopulatory behavior of the male and the activity produced by homogenates of the female abdomen may indicate the existence of a female sex pheromone.

3. The coital stance of the male is quite precarious. The female cooperation is essential for successful aedeagal intromission. However, once the male aedeagus is inserted into the bursa copulatrix of the female, the genitalic grasp of the male is seemingly sufficiently strong to maintain union despite female attempts at dislodgement.

4. Females appear to be monogamous, and males appear to have a relative refractory period during which females elicit no sexual arousal. The refractory period may be caused by sperm depletion or by the need to manufacture spermatophores.